

Epidemiology (Seroprevalence and Risk Factors) of Parenteral Hepatitis (B and C) among Prisoners in Menoufia Governorate

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Abstract

Background: During incarceration, prisoners may acquire new infections due to overcrowding, poor medical diagnosis and treatment, insufficient infection control, an absence of harm reduction efforts like condom use or needle exchange, and sudden transfer to other facilities or discharge into the community without provisions for ongoing therapy. Prisons are considered facilities liable of high risk of infectious disease. Investigations carried out in prisons around the world have shown a high prevalence of blood borne hepatitis viruses.

Aim of Study: This study conducted aiming to determine the prevalence and behavioral correlates of HCV, and HBV infections among Egyptian prisoners with especial emphasis on their risk factors.

Patients and Methods: All studied prisoners were subjected to a predesigned questionnaire including socio-demographic data, pre-imprisonment risk factors and intra-prison risk factors. Blood samples were collected from the studied prisoners who had never investigated before for HBV and or HCV infection and examined for Anti-HBc and Anti-HCV.

Results: Prevalence of HBV among studied group was 8.02%, HCV was 16.4% and with both HBV and HCV infection was 1.9%. Multivariate analysis of risk factors of HBV and HCV infection among prisoners revealed that previous imprisonment history, education status, age, history of tattoo, history of intra-prison dentist visiting, imprisonment duration 10 years were independent predictors of viral hepatitis infection among prisoners.

Conclusion: Prisoners with chronic HCV infection should undergo a full diagnostic procedure and clinical staging before being considered for treatment, since inmates with HCV related chronic hepatitis can achieve a sustained virological response with the same frequency as free patients.

Recommendations: The prison authorities and physicians should implement strategies to improve the diagnostic and therapeutic approach to HCV in prisoners, general screening for anti HCV antibody being the first step in this approach.

Key Words: Prisoners – Security personnel – Prevalence – HCV – HBV – Risk factors.

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Introduction

EGYPT is considered an area of intermediate endemicity for the virus as the prevalence of HBV chronic carriers among adults in the general population ranged from 2% to 7% and the prevalence of Hepatitis C Virus (HCV) varies broadly among geographic areas, it is estimated that there are 170 million Hepatitis C Virus (HCV) chronic carriers globally and the prevalence rate 18.1% in Egypt [1].

Prisons are known for connection of high risk of infection diseases [2] as a result of possibility of transmission of infections in prisons surroundings [3]. Persons with inferior health status are main representatives among those who have contact with criminal juristic system [4].

During imprisonment, prisoners often engage in unprotected sex, syringe/needle sharing, or sharing of other paraphernalia (spoon, water) because of the limited access to condoms and injecting equipment, etc. Tattooing and scarification are also common [5].

Once in prison, overcrowding, violence, separation from family and emotional problems are additional reasons that may induce inmates to start or continue unsafe habits. An estimate of the incidence of new HCV infections in prisons exceeds 30 per 100 persons per year [6].

Many characteristics of confined people, including low socioeconomic status, illicit drug use, and multiple sexual partners, are predictors of these infections. Therefore, most are already infected at the time of imprisonment, becoming a source of propagation and maintenance of these viruses in the prison setting [7].

Iatrogenic infection remains the highest risk factor for HCV acquisition in Egypt, which has prompted multiple national programs to raise public awareness and establish infection control programs at healthcare facilities throughout Egypt [8].

Most are already infected at the time of imprisonment, becoming a source of propagation and maintenance of these viruses in the prison setting [9].

Proper treatment of chronic hepatitis C in prison is rare for social and educational reasons and, not least, because most inmates with HCV infection remain unaware of their virological condition. Several other barriers may prevent HCV inmates from being admitted for treatment: Individual problems (drug abuse, stress, fear, lack of confidence) and social problems (stigma, discrimination, difficulty to relate to the health personnel) [10].

The prison authorities and physicians should implement strategies to improve the diagnostic and therapeutic approach to HBV and/or HCV in prisoners, general screening for anti-HBc and/or anti-HCV antibody being the first step in this approach. Prisoners with chronic HBV and/or HCV infection should undergo a full diagnostic procedure and clinical staging before being considered for treatment, since inmates with HBV and/or HCV-related chronic hepatitis can achieve a sustained virological response with the same frequency as free patients [11].

Health care in Egyptian prisons is provided in an outpatient clinic by one general practitioner. Within 1 day of arrival, prisoners are medically examined, and those who are ill are directly admitted into the prison clinic and also all prisoners are routinely investigated from time to time. The living conditions are adequate with respect to sanitary facilities, water, light, ventilation, sleeping accommodations and food [12].

Although viral hepatitis disease can lead to huge burden especially in endemic areas, it is preventable. Prevention is the only safe strategy against high prevalence of viral hepatitis. Having enough knowledge and proper attitudes toward these infections are cornerstones of preventing the spread of them [13].

The prevention of blood-borne pathogen transmission is a high priority for the Ministry of Health and Population (MOHP) in Egypt. Despite the availability of several reports concerning anti-Hepatitis C Virus (HCV) seropositivity among apparently healthy Egyptian populations, little

attention has been paid to the HCV and Hepatitis B Virus (HBV) burden of Egyptian prisoners [14].

Increasing preventative efforts to reduce the spread of viral hepatitis through raising awareness and increasing HBV and/or HCV diagnostic testing in prisons have been recommended [15].

Patients and Methods

A cross sectional field study was conducted on 648 prisoners which were categorized into 492 males and 156 females out of 950 eligible prisoners captured in the prison. This study was conducted from the first of June 2016 to the end of November 2017. The study obtained all required ethical approvals from the Ethical Committees of National liver Institute, Menoufia University, Media and Public Relations Department at the Ministry of the Interior, National Security Sector, and the Prison Service Directorate of Health Care. An oral consent was obtained from all participants.

A pre-designed questionnaire was completed among the selected prisoners in Shebin El-Kom Public Prison, Menoufia Governorate, Egypt. The self-administered questionnaire was developed to collect socio-demographic data of prisoners through interviewing them, assessing risk of exposure to hepatitis B and C infection before entering prison through answering questions tackling previous hepatic testing result, past history of viral hepatitis infection manifestations, history of previous surgery, history of previous blood transfusion, family history of viral hepatitis and history of hepatitis B vaccination and assessing risk exposure to hepatitis B and C infection after entering prison through asking questions tackling history of previous imprisonment, previous imprisonment duration, history of previous dental procedures, prison shaving method, availability of prison personal hygienic tools, history of prison labor or abortion, manifestations of prison active viral hepatitis, prison surgery, prison blood transfusion and previous health education program at prison.

The final version of the questionnaire had a good indicator for reliability (as indicated by Alpha Cronbach test value of 0.82 for knowledge and 0.77 for attitude and practice).

Laboratory investigations:

Anti-HBc nor anti-HCV were investigated in prison hospital laboratory through collecting 5cc of blood samples from all persons included in the study by vacuum vein puncture, using a dry 5-mL tube. The serum was separated, centrifuged, aliquot and stored at -20°C .

Determination of anti-HBc in serum:

Each serum sample was tested for antibodies to hepatitis B (anti-HBc) by ELISA (Enzyme Linked Immuno Sorbent Assay).

Determination of hepatitis B core antigen (anti-HBc) test:

A positive, antibodies to hepatitis B core antigen (anti-HBc) total result may indicate, either, recent, past/resolved, or chronic Hepatitis B Viral (HBV) infection.

A negative anti-HBc total results indicate the absence of recent, past/resolved, or chronic hepatitis B.

Determination of Hepatitis C Virus antibody (Anti-HCV) in serum:

Detected by third-generation Enzyme Linked Immunosorbant Assay (ELIZA), using kit from Biochemistry. Immune system Inc. It qualitatively determined the presence of antibodies to four recombinant HCV proteins in serum.

Statistical analysis:

SPSS software (Version 20.0) SPSS Inc., Chicago, U.S. was used for all statistical analyses. Data were presented using descriptive statistics in the form of frequencies and percentages. Chi-square test (χ^2) was used to study association between qualitative variables. Whenever any of the expected cells were less than five, Fischer's Exact test was used. For all p -value less than 0.05 was considered as significant.

Results

This study was conducted on 648 prisoners, 67.3% of them were of age less than 40 years and illiterate, 75.9% of them were males, 74.4% working prisoners, 67% were of rural areas and 73.8% was married prisoner. All male participants mentioned that shaving is done by prison barber without changing shaving equipment and there is no available personal hygienic tool (scissor, tooth brush). 66% of prisoners who visited hospital had mentioned that they used new syringes. 83.6% of the studied prisoners spent less than 10 years at this prison (Table 1). The prevalence of HBV among studied group was 8.02%, HCV was 16.4% and with both HBV and HCV infection was 1.9% Fig. (1). There was a statistical significant association between prisoners' socio-demographic data and positive anti-HBc and/or positive anti-HCV prisoners in which prisoners with age groups more than or equal 40 years were five times risky to

acquire viral hepatitis B & C than those below 40 years, while illiterate prisoners were two times risky to acquire viral hepatitis than educated one and married prisoners were 2.6 more risk than non-married (Table 2). It was found that prisoners with history of tattoo were risky to acquire viral hepatitis than others with odds ratio (2.4 & CI 1.4-4 and p -value <0.001) (Table 3). There was a statistical significant association between pre imprisonment risk factors and positive anti-HBc and/or anti-HCV prisoners in which prisoners with history of previous imprisonment were five times risky to acquire viral hepatitis than those who imprisoned for the first time while prisoners with imprisonment duration more than 10 years were eleven times risky to acquire viral hepatitis than others. Prisoners with previous intra-prison dentist visit were four times risky to acquire viral hepatitis than others and prisoners with positive history of intra prison surgery were five times risky to acquire viral hepatitis than others (Table 4). A multivariate logistic regression analysis of risk factors of HBV and HCV infection among prisoners revealed that previous imprisonment history, education status, age, history of tattoo, history of intra-prison dentist visiting, prolonged imprisonment duration (≥ 10 years) were independent predictors of viral hepatitis infection among prisoners with odds ratio (6.8, 4.2, 3, 3.1, 2.8, 2.6) respectively, while marital status and history of previous intra-prison operation were dependent predictors of viral hepatitis infection among prisoners (Table 5).

Table (1): Socio demographic criteria among the studied groups.

Socio demographic data	The studied prisoners (324)	
	No.	%
<i>Age groups:</i>		
<40 years	436	67.3
≥ 40 years	212	32.7
<i>Gender:</i>		
Male	492	75.9
Female	156	24.1
<i>Marital status:</i>		
Married	478	73.8
Unmarried	170	26.2
<i>Education:</i>		
Illiterate	436	67.3
Educated	212	32.7
<i>Residence:</i>		
Rural	434	67.0
Urban	214	33.0
<i>Imprisonment duration:</i>		
<10 years	542	83.6
10 years	106	16.4

Table (2): Association between positive anti-HBc and/or positive anti-HCV prisoners with socio demographic data.

Sociodemographic data	Anti-HBc and/or anti-HCV				OR (95%CI)	p-value
	Positive		Negative			
	N (170)	%	N (478)	%		
Age groups:						
<40 years	70	41.2	366	76.6	4.67	0.001 (2.7-8.2)
40 years	100	58.8	112	23.4		
Gender:						
Male	136	80.0	356	74.5	1.4	0.4 (0.7-2.6)
Female	34	20.0	122	25.5		
Marital status:						
Unmarried	24	14.1	146	30.5	2.7	0.003 (1.3-5.5)
Married	146	85.9	332	69.5		
Education state:						
Illiterate	92	54.1	344	72.0	2.2	0.003 (1.3-3.8)
Educated	78	45.9	134	28.0		

Chi square test was used to test the association.
 OR : Odds Ratio.
 CI : Confidence Interval.
 p>0.05 (Non Significant).
 p<0.05 (Significant).
 p<0.01 (Highly Significant)

Table (3): Association between positive anti-HBc and/or positive anti-HCV prisoners' pre-imprisonment risk factors.

Pre-imprisonment risk factors	Anti-HBc and/or anti-HCV				OR (95%CI)	p-value
	Positive		Negative			
	N (170)	%	N (478)	%		
History of previous surgery:						
No	126	74.1	398	83.3	1.7	0.07 (0.9-3.3)
Yes	44	25.9	80	16.7		
History of previous blood transfusion:						
No	164	96.5	466	97.5	1.4	0.7 (0.3-6.6)*
Yes	6	3.5	12	2.5		
Tattoo(N=186):						
No	98	57.6	364	76.2	2.4	0.001 (1.4-4)
Yes	72	42.4	114	23.8		
Family history of hepatitis:						
No	162	95.3	448	93.7	0.7	0.8 (0.2-2.5)
Yes	8	4.7	30	6.3		

Chi square test was used to test the association.
 OR : Odds Ratio.
 CI : Confidence Interval.
 * : Fisher's exact test.
 p>0.05 (Non Significant).
 p<0.05 (Significant).
 p<0.01 (Highly Significant).

Table (4): Association between positive anti-HBc and/or positive anti-HCV prisoners with intra prison risk factor.

Intra prison risk factors	Anti-HBc and/or anti-HCV				OR (95%CI)	p-value
	Positive		Negative			
	N (170)	%	N (478)	%		
History of previous imprisonment (N= 82):						
No	124	72.9	442	92.5	4.6	0.001 (2.2-9.5)
Yes	46	27.1	36	7.5		
Imprisonment duration:						
<10 years	96	56.5	446	93.3	10.7	0.001 (5.3-22.1)
10 years	74	43.5	32	6.7		
History of dentist visiting(N= 242):						
No	63	36.5	334	72.0	4.5	0.001 (2.6-7.8)
Yes	108	63.5	134	28.0		
Availability of sterilization equipment (autoclave):						
No	4	3.7	4	3.0	1.3	1.0 (0.1-13)*
Yes	104	96.3	130	97.0		
History of previous surgery:						
No	152	89.4	468	97.9	5.5	0.003 (1.6-19.7)*
Yes	18	10.6	10	2.1		

Chi square test was used to test the association.
 OR : Odds Ratio.
 CI : Confidence Interval.
 * : Fisher's exact test.
 p>0.05 (Non Significant).
 p<0.05 (Significant).
 p<0.01 (Highly Significant).

Table (5): Backward logistic regression analysis of viral hepatitis infection in prisons.

Variables	B	S.E.	Wald test	p-value	OR (95%CI)
<i>r</i> square: 48.1% B constant = -6.3					
• Age	1.09	0.4	9.3	0.002	3 (1.5-5.9)
• Marital status	0.8	0.4	3.4	0.07	2.2 (0.95-5)
• Education state	1.5	0.4	15.6	0.0001	4.2 (2.1-8.7)
• Tattoo	1.1	0.4	8.9	0.003	3.1 (1.5-6.0)
• Previous imprisonment	1.9	0.4	19.6	0.0001	6.8 (2.9-15.9)
• Imprisonment duration	0.9	0.2	21.1	0.0001	2.6 (1.7-3.9)
• History of dentist visiting	1.03	0.3	9.2	0.002	2.8 (1.4-5.5)
• History of previous intra prison surgery	1.4	0.8	3.05	0.081	4.2 (0.8-20.8)

p>0.05 (Non Significant).
 p<0.05 (Significant).
 p<0.01 (Highly Significant).

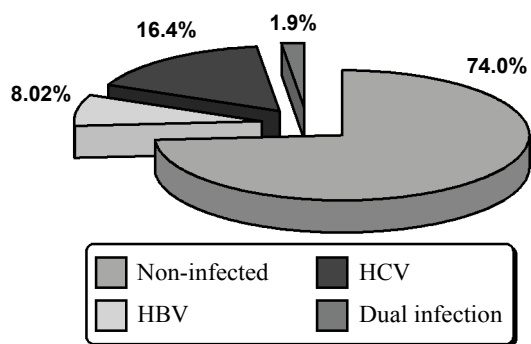


Fig. (1): Prevalence of HBV and HCV infections among the studied prisoners.

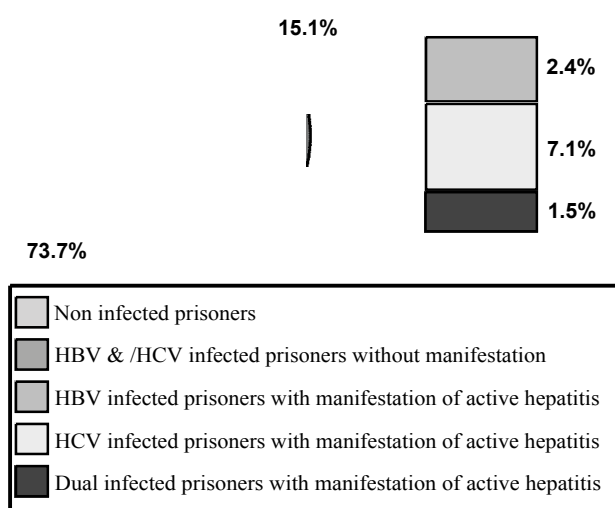


Fig. (2): Percentage of HBV & /HCV infected prisoners with manifestation of active hepatitis.

Rate of conversion of hepatitis B & C negative prisoners (in pre-imprisonment testing) to hepatitis B & C positive after imprisonment

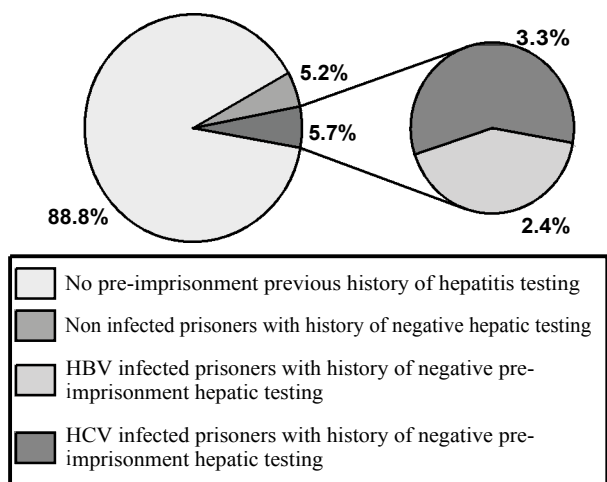


Fig. (3): Rate of conversion of hepatitis B & C negative (in pre-imprisonment testing) to hepatitis B & C positive after imprisonment.

Discussion

The high sero-prevalence of HCV and HBV infection among inmates entering prison should be a serious concern to public health officials, health care providers, and policymakers as infected male and female inmates' might continue to engage in high-risk behaviors and infect others while in custody therefore, most are already infected at the time of imprisonment, becoming a source of propagation and maintenance of these viruses in the prison setting and infected inmates may transmit the disease to people in communities into which they are released [16].

In the current study, HCV Abs prevalence was 16.4% Fig. (1) which was agreed with that reported in other study conducted in Minia governorate prison since 2013 (15.8%) 79 out of 500 prisoners [12]. On the contrary, this HCV sero-prevalence 16.4% was significantly higher among those studied prisoners compared to that reported in Australia (33.3%) prison [17]. Also this study showed that 8.02% of the studied prisoners had evidence of antibodies against the hepatitis B core antigen Fig. (1). The results of this study were in agreement with Centers of Disease Prevention and Control (CDC, 2015) which reported that Egypt has an intermediate prevalence (2-8%) of HBV infection. Although co-existing infections of HBV and HCV was 1.9%. The same result was found by Mohamed et al., [12] who reported that 1.2% of prisoners were dually infected with HBV and HCV. The coexisting infection in this study was due to illegal drug users and septic tattoo technique done at prison although it was denied by prison military authorities in Egypt and these questions about illegal drug users and tattoo was omitted by military authorities.

Mohamed et al., [12] reported that prisoners over 45 years of age was associated with positive serology for HCV (odds ratio 2.3 with 95% CI, 1.6-3.7) which was consistent with the current study which reported that prisoners over 45 years old were six times risky to have positive serology for HCV than others. This might be explained either by a higher risk of exposure to HCV over time predominantly because of their low socioeconomic level resulted in spread of bad prisoners habits such as injecting drug users, abnormal sexual behavior and tattooing behind military supervision or might be explained by a cohort effect reflecting increased exposure to HCV transmission during preventive health campaigns that used contaminated needles in massive anti-schi-stsomiiasis injections a long time ago.

This study reported that no significant difference in HBV and/or HCV sero-prevalence with respect to gender which is consistent Semaille et al., 2013 who stated that 29.7% prisoners were infected with HCV and the prevalence was higher in women than in men (37.9% vs. 28.3%). Although, Mohamed et al., [12] found that HCV prevalence was statistically higher among males than females (83.7% vs. 16.3%) with odds ratio 3.1 (95% CI 2.9-4.3); which differed from the current study, this was explained by high rate of intravenous drug users which isn't present in Menoufia prison.

This study reported that married prisoners were five times risky to acquire viral hepatitis C than others and this was in consistent with Hennessey KA et al., 2009 who stated that marriage was found to be very risk for HCV (OR=3). This result differed from Hala et al., 2013 who reported that sexual transmission was extremely rare among long-term monogamous couples.

This study reported a significant difference in HBV and/or HCV positive sero-prevalence with respect to education showed higher prevalence among illiterate prisoners (54.1%) in which they were two times risky to acquire infection than educated prisoners. This result was in agreement of Adjei et al., 2008 and Verneuil et al., 2009 studies in which prisoners in other prisons studies who had low literacy rates, low socioeconomic status were more infected. This might be explained that illiterates may not acquire the scientific knowledge which can change their attitude and improve their behavior.

This study showed that the participants who spent more than 10 years in prison were eleven times risky to be positive for antibodies to HBV and HCV (Table 3). These findings were agreed with Mohamed et al., [12] who found that the participants who spent more time in prison over the previous 10 years were of 7.1 (95% CI, 5.3-9.2) times more likely to be HBV and or HCV-positive and also reported a significant association by univariate analysis of previous imprisonment with positive HCV serology (odd ratio 4.9 with CI, 2.9-5.8). This also agreed with the results of studies of Reekie et al., [17], who found that individuals incarcerated for a longer time were 2. 15 times more likely to be HCV-positive.

This study showed that the prisoners with previous imprisonments were five times risky to be positive for antibodies to HBV and HCV (Table 4). This also was in consistent with Larney et al.,

[18] who reported that previous imprisonment was registered in the life history of the majority (89%) of anti-HCV-positive inmates in the main prison facility in Lebanon. On contrary to this study result Mohamed et al., [12] reported that there was no significant association by Univariate analysis of previous imprisonment with positive HBV serology which might be explained by the idea that prison is a place where several risk factors act together which explain the reason of increasing the risk of viral infections with a previous incarceration and with a longer time in prison associated with re-incarceration.

This study revealed that history of tattoo was an important risk factor for HCV infection (p -value <0.01) while it wasn't a risk factor for HBV infection. The same findings was observed by Mahfoud et al., [19] who reported that all anti-HCV positive Egyptian prisoners had tattoos compared to only 60% of anti-HCV-negative individuals. This important finding might be explained by poor general awareness of the risk of tattooing in which tattooing in Egypt was generally performed using non-sterile equipment such as paper clips and guitar strings which were risk factors for acquisition of blood-borne pathogens.

This study revealed that prisoner who had a dental procedure was five times risk to acquire HCV infection than others. This was in agreement with the study of Hennessey et al., 2009 who revealed that persons who had dental exposure were about 3 times higher risk for HCV infection than others. The association with dental extraction might be explained by poor sterilization of instruments used in dental procedures and not fulfilling aseptic technique during performance of any dental measures.

In this study all male prisoners' mentioned that shaving was done by prison's barber without changing shaving equipment and there was no available personal hygienic tool (scissor, tooth brush) which might be an important channel for transmission of these infections. This was in agree with previous studies reported that sharing toiletries were significantly associated with increased prevalence of viral hepatitis Santos et al., [20] and Mohamed et al., [12]. These findings might be explained the presence of clear evidence that prisoners' personal hygienic equipment' were frequently shared among inmates, and so there was a risk of equipment contamination by parenteral transmitted viruses with increased rate within prison system than outside.

This study revealed that prisoners with previous history of intra-prison surgery were five times risky to have HCV infection than other prisoners (Table 4). This was in agreement with Hennessey et al., 2009 cross sectional study in the United states that showed significant association between history of intra-prison surgery and HCV infection (OR 2.41).

Conclusions:

Based on the findings of this study, we concluded that, institutions of incarceration in both lower and upper income countries were incubators for infectious diseases in which prisoners were a core transmitter group with high risk behaviors' like tattooing, injection drug use, sexual activity, low literacy levels and absence of harm reduction efforts like condom use or needle exchange, these factors not only led to greater vulnerability among prisoners with frequent flow of prisoners into the community which might lead to epidemics of infectious diseases among the general population, therefore the prison authorities' and physicians should implement strategies to improve the diagnostic and therapeutic approach to HCV in prisoners, general screening for anti-HCV antibody being the first step in this approach.

References

- HUANG C., QIU F. and GUO M.: "Prevalence and risk factors of hepatitis C among former blood donors in rural China." *I J I D*, 1495: 1-4, 2012.
- SEKOKO A.C. and BOTTA G.A.: "Human immunodeficiency virus and hepatitis virus infection in correctional institutions in Africa: Is this the neglected source of an epidemic? *J. Med. Microbiol.*, 55: 481-2. [Pub. Med], 2006.
- STARK K., HERRMANN U., EHRHARDT S. and BIENZLE U.: "A syringe exchange programme in prison as prevention strategy against HIV infection and hepatitis B and C in Berlin, Germany." *Epidemiology and Infection*, 134 (4): 8149-12. Doi:10.1017/S0950268805005613. PMC 2870452. PMID 1637118, 2006.
- BUTLER T. and PAPANASTASIU C.: "National prison entrants' blood borne virus and risk behavior survey report-2004 and 2007: Prevalence of HIV, hepatitis C, hepatitis B, and risk behaviors among Australian prison entrants." (National Drug Research Institute, National Centre in HIV Epidemiology and Clinical Research, Sydney, 2008), 1-8, 2008.
- HELLARD M.E., AITKEN C.K. and HOCKING J.S.: "Tattooing in prisons-not such a pretty picture." *Am. J. Infect. Control*, 35: 477-80, 2007.
- DOLAN K., TEUTSCH S., SCHEUER N., LEVY M., RAWLINSON W., KALDOR J., et al.: "Incidence and risk for acute hepatitis C infection during imprisonment in Australia." *Eur. J. Epidemiol.*, 25: 143-8. [PMID: 20084429 Doi: 10.1007/s10654-009-9421-0], 2010.
- MACALINO G.E., VLAHOV D., DICKINSON B.P., SCHWARTZAPFEL B. and RICH J.D.: "Community incidence of hepatitis B and C among reincarcerated women: *Clin. Infect. Dis.*, 41: 998-1002, 2005.
- PAEZ JIMENEZ A., SHARAF ELDIN N., RIMLINGER F., et al.: "HCV iatrogenic and intrafamilial transmission in Greater Cairo, Egypt." *Gut*, 59 (11): 1554-60, 2010.
- STRAZZA L., MASSAD E., AZEVEDO R.S. and CARVALHO H.B.: "Behavior associated with HIV and HCV infection in female prison inmates in Sao Paulo, Brazil." *CaD SAUDE PUBLICA.*, 23: 197-205, 2007.
- YAP L., CARRUTHERS S., THOMPSON S., CHENG W., JONES J., SIMPSON P., et al.: "A descriptive model of patient readiness, motivators, and hepatitis C treatment uptake among Australian prisoners." *PLoS One*, 9: e87564 [PMID: 24586281 Doi: 10.1371/journal.pone.0087564], 2014.
- RICE J.P., BURNETT D., TSOTSIS H., LINDSTROM M.J., CORNETT D.D., VOERMANS P., et al.: "Comparison of hepatitis C virus treatment between incarcerated and community patients." *Hepatology*, 56: 1252-60, [PMID: 22505121 Doi: 10.1002/hep.25770, 2012.
- MOHAMED H.I., SAAD Z.M., ABD-ELREHEEM E.M., ABD-ELGHANY W.M., MOHAMED M.S., ABD EL-NAEEM E.A., et al.: "Hepatitis C, hepatitis B and HIV infection among Egyptian prisoners: Seroprevalence, risk factors and related chronic liver diseases." *J. Infect. Public Health*, 6: 186-95, 2013.
- ROYA MANSOUR-GHANAIE, FARAHNAZ JOUKAR, FATEMEH SOUTI and ZAHRA ATRKAR-ROUSHA: "Knowledge and attitude of medical science students toward hepatitis B and C infections." *Int. J. Clin. Exp. Med.*, 6 (3): 197-205, www.ijcem.com/ISSN:1940-5901/IJCEM1301003, 2013.
- TALAAT M., RADWAN E., EL-SAYED N., ISMAEL T., HAJJEH R. and MAHONEY F.J.: "Case-control study to evaluate risk factors for acute hepatitis B virus infection in Egypt". *Eastern Mediterranean Health Journal*, 16 (1): 4-9, 2010.
- Advisory Council on the Misuse of Drugs: "The Primary Prevention of Hepatitis C among Injecting Drug Users." London: Home Office, Advisory Council on the Misuse of Drugs, 1-45, 2009.
- MACALINO G.E., VLAHOV D., DICKINSON B.P., SCHWARTZAPFEL B. and RICH J.D.: "Community incidence of hepatitis B and C among reincarcerated women." *Clin. Infect. Dis.*, 41: 998-1002, 2005.
- REEKIE J.M., LEVY M.H., RICHARDS A.H., WAKE C.J., SIDDALL D.A., BEASLEY H.M., et al.: "Trends in HIV, hepatitis B and hepatitis C prevalence among Australian prisoners-2004, 2007, 2010." *Med. J.*, 200: 277-80, 2014.
- LARNEY S., KOPINSKI H., BECKWITH C.G., ZALLER N.D., JARLAIS D.D., HAGAN H., et al.: "Incidence and prevalence of hepatitis C in prisons and other closed

settings: Results of a systematic review and meta-analysis. "Hepatology; 58: 1215-24. <http://dx.doi.org/10.1002/hep.26387>, 2013.

19- MAHFOUD Z., KASSAK K., KREIDIEH K., SHAMRA S. and RAMIA S.: "Prevalence of antibodies to human immunodeficiency virus (HIV), hepatitis B and hepatitis C and risk factors in prisoners in Lebanon." J. Infect.

Dev. Ctries, 4: 144-9. [PMID: 20351454 Doi: 10.3855/jidc.517], 2010.

20- SANTOS B.F., De SANTANA N.O. and FRANCA A.V.: "Prevalence, genotypes and factors associated with HCV infection among prisoners in Northeastern Brazil. World J. Gastroenterology, 17: 3027-34. [PMID: 21799649 Doi: 10.3748/wjg.v17.i25.3027], 2011.

علم الوبائيات (الانتشار المصلي وعوامل الخطورة) للإصابة بالتهاب الكبدى الفيروسي (B و C) بين سجناء محافظة المنوفية

أثناء السجن، قد يكتسب السجناء إصابات جديدة بسبب الاكتظاظ، وسوء التشخيص والعلاج الطبي، وعدم كفاية أساليب مكافحة العدوى، وغياب جهود الحد من الضرر مثل استخدام الواقي الذكري أو تبادل الإبر، والنقل المفاجئ إلى مرافق أخرى أو التفريغ في المجتمع دون شروط مستمرة العلاج. تعتبر السجناء مرافق عرضة لخطر الإصابة بالأمراض المعدية. أظهرت التحقيقات التي أجريت في السجناء في جميع أنحاء العالم أن ارتفاع معدل إنتشار فيروسات التهاب الكبد التي تنتقل عن طريق الدم وتهدف هذه الدراسة نحو تحديد مدى إنتشار الإرتباطات السلوكية لمرض التهاب الكبد (HCV) والعدوى بفيروس التهاب الكبد (B) بين السجناء المصريين مع التركيز بشكل خاص على عوامل الخطر لديهم.

مرضى وطرق حيث خضع جميع السجناء المدربين لإستبيان سبق تقديمه، بما في ذلك البيانات الإجتماعية والديموغرافية، وعوامل الخطر السابقة للسجن وعوامل الخطر داخل السجن. تم جمع عينات الدم من السجناء الذين درسوا والذين لم يسبق لهم التحقيق من قبل العدوى بالتهاب الكبدى الفيروسي باء أو سى ودرست لمكافحة الإلتهاب الكبدى الفيروسي باء أو سى. وأسفرت نتائج هذه الدراسة أن نسبة إنتشار فيروس الألتهاب الكبدى باء بين مجموعة الدراسة ٨.٠٢٪، و١٦.٤٪ نسبة أنتشار الألتهاب الكبدى الفيروسي سى و ١٠.٩٪ مع كل من الإصابة بعدوى الإلتهاب الكبدى الفيروسي باء وسى حيث كشف التحليل متعدد المتغيرات لعوامل الخطورة من عدوى فيروس الورم الحليمى البشرى وفيروس الإلتهاب الكبدى الفيروسي بين السجناء أن تاريخ السجن السابق، والحالة التعليمية، والعمر، وتاريخ الوشم، وتاريخ زيادة طبيب الأسنان داخل السجن، ومدة السجن < ١ سنوات كانت عوامل تنبئ مستقلة للإصابة بالإلتهاب الكبدى الفيروسي بين السجناء. أستنتجت هذه الدراسة أنه يجب أن يخضع السجناء المصابين بعدوى الإلتهاب الكبدى الفيروسي المزمن لإجراء تشخيص كامل وتدبير سريري قبل النظر في العلاج، حيث إن النزلاء الذين يعانون من الإلتهاب الكبدى الفيروسي المزمن المرتبط بفيروس الإلتهاب الكبدى الفيروسي يمكن أن يحققوا إستجابة فيروسية مستمرة مع نفس معدل تكرار المرضى وقد أوصت هذه الدراسة أنه يجب على سلطات السجن والأطباء تنفيذ إستراتيجيات لتحسين الأسلوب التشخيصى والعلاجى لفيروس الإلتهاب الكبدى الفيروسي بين السجناء، والفحص العام للجسم المضاد للألتهاب الكبدى الفيروسي سى هو الخطوة الأولى فى هذا الأسلوب.